MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

EBM 7010 – Prototyping and Product Life-cycle Management

(All Sections / Groups)

27 FEBRUARY 2017

9.00 a.m - 12.00 a.m
(3 Hours)

INSTRUCTION TO STUDENT

1. This question paper consists of 3 pages only (including this page).
2. Attempt ALL **FOUR** questions. All questions carry equal marks (25 marks) and the distribution of the marks for each question is given.
3. Please print all your answers in the Answer Booklet provided.

Question 1

a) A logistic manager called up a marketing specialist to learn about Product LifeCycle Management. Identify 4 phases of a typical product life cycle (with a diagram), and give example on how the Product LifeCycle Management (PLM) is important in each phase.

[12 marks]

b) Explain in your own words, briefly how each strategy can be used to enhance the internal or external factors of a given product lifecycle.

[13 marks]

Question 2

(a) A bicycle manufacturing company would like to introduce product lifecycle management system. As the product engineer, kindly advise the methodology from design and manufacturing structures.

[16 marks]

(b) Both design and manufacturing structure can be integrated into single system using extended enterprise resource planning and execution system. Discuss on the advantages and disadvantages of using integrated system in the company.

[9 marks]

Continued...

Question 3

(a) Describe a typical product life cycle with the aid of a chart.

[8 marks]

(b) With the aid of a table, list down the components of PLM used in each phase of the product life cycle.

[17 marks]

Question 4

As a product manager, you are required to look into the measurement system uncertainty of an interferometer. Appendix A shows the results submitted by your engineers.

(a) Assuming all parameters are independent to each other. Estimated the value of u(Device), u(TEMPERATURE), u(POINT). What if the components are not independent? Estimated the uncertainty for both cases.

[12 marks]

(a) Identify the most significant factor on both cases. Discuss in details, the systematic approach to enhance the system uncertainty.

[6 marks]

(b) Using your own word, explain the impact of the uncertainty due to the measurement over the product liftcycle management of a precision part (up to 5 um precision requirements)

[7 marks]

End of Paper.

Appendix A

Table C.1 — Estimation of measurement uncertainty for laser positioning measurement under average industrial conditions

contributors	parameters	unit	u	unit	U	unit	equation
device		mm					
o measuring length	1751,000	ppm					
o accuracy, automatic compensation, 15-25 °C	3,400	µm					
oo influence	5,953	ppm	1,7	µm			4
o wavelength accuracy	0,200	µm					4
oo influence	0,350		0,1	µm			
u(DEVICE)				**µm**			1
alignment							
o beam alignment							
oo alignment, assumed	4,000	mm					
oo measuring length	1751,000	mm					
oo angle max	0,131	°					C.5
oo influence 2nd order	4,569	µm					C.5
u(MISALIGNMENT)			**1,3**	**µm**			4
compensation of workpiece temperature							
o measuring length	1751,000	mm					
o thermal expansion coefficient	12,000	µm/m°C					
o difference to 20 °C, maximum	5,000	°C					
o temperature measurement							
oo deviation, maximum	0,700	°C	0,2	°C			4
u(M, MACHINE TOOL)			4,2	µm			C.6
o uncertainty of expansion coefficient	2,000	µm/m°C	0,6	µm/°C			4
u(E, MACHINE TOOL)			5,1	µm			C.7
u(TEMPERATURE)				**µm**			C.8
EVE, environmental variation error	1,700	µm					
u(EVE)			**0,5**	**µm**			C.9
repeatability of set-up							
o maximum pitch and yaw	50,000	µm/m					
o Abbe-offset between two set-ups	50,000	mm					
o change in measured length	3,536	µm					C.11
u(SET-UP)			**1,0**	**µm**			4
u(POINT) at measuring length				µm			C.12
number of measurement runs, n			5,0				
U(R+, R–)			**1,0**	**µm**	**2**	**µm**	C.13
U(B)			**2,1**	**µm**	**4**	**µm**	C.14
U(R)			**2,3**	**µm**	**5**	**µm**	C.15
U(E, E+, E–)			**7,0**	**µm**	**14**	**µm**	C.16
U(M)			**7,0**	**µm**	**14**	**µm**	C.16
U(A)			**7,1**	**µm**	**14**	**µm**	C.17
Correction of repeatability values	uncorrected	corrected					
R+ according to Table 2 of ISO 230-2	2,9	2,1	µm				C.10
R– according to Table 2 of ISO 230-2	2,5	1,5	µm				C.10
s+(9) for R according to Table 2 of ISO 230-2	0,7	0,5	µm				C.10
s–(9) for R according to Table 2 of ISO 230-2	0,6	0,3	µm				C.10
B(9) for R according to Table 2 of ISO 230-2	3,9		µm				
R according to Table 2 of ISO 230-2	6,5	5,6	µm				C.10

